



NASA Goddard Space Flight Center's Top 10 Technology Spinoffs

You know that NASA studies our planet, the solar system, and the Universe. But did you know that NASA inventions are being used to help people here on Earth?

Here are some of the most exciting examples of space program technologies—developed at NASA Goddard Space Flight Center in Greenbelt, Maryland—that have had spinoffs into new areas:

- Health and medicine
- Sports
- Transportation
- Materials

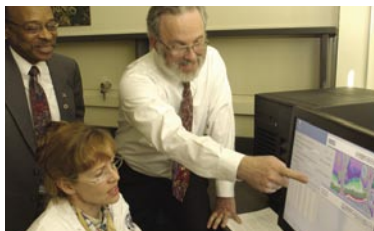
More information about these spinoff successes is available at:

http://ipp.gsfc.nasa.gov/SS_top-ten.html

To learn more about Goddard's innovative technologies, state-of-the-art facilities, and expertise, contact the:

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Health and Medicine



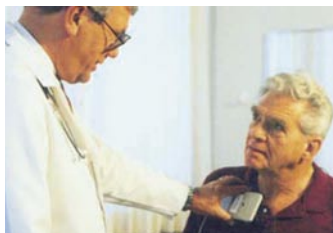
Better Disease Diagnosis through Better Medical Imaging (2004)

Bartron Medical Imaging is using Goddard-developed software as a key technology in its Med-Seg™ imaging device, which analyzes digital X-rays, soft-tissue scans, mammograms, ultrasounds, MRI

images, and CT scans. Goddard's software provides "image segmentation" that helps reveal details that cannot be seen with the naked eye, greatly aiding disease diagnoses.

Joint Technology Gets Patients Up and Walking (2003)

Based on a Goddard-developed prototype, Enduro Medical Technology's revolutionary walker—the Secure Ambulation Module (SAM)—allows physical therapy patients to stand and walk safely without the aid of therapists. The walker supports the patient via a pelvic harness, which relies on a flexible yet stable "cable-compliant" joint Goddard originally developed for sounding rocket assemblies and used in robotics research. Enduro has built and tested a youth version (SAM-Y) of the walker and plans to develop an equine version for horse rehabilitation.



Programmable Pacemaker (1995)

Advanced cardiac pacemakers from Pacesetter Systems, Inc., incorporated multiple NASA technologies, including a long-life rechargeable battery, super-miniaturized electronics, and two-way communications technology that allowed

physicians to reprogram an implanted pacemaker without surgery. Known as the Trilogy™ line, this pacemaker represents the fourth-generation advancement of the unit first developed in the 1970s by Goddard, Johns Hopkins Applied Physics Laboratory, and Pacesetter.

Breast Biopsy System (1994)

An innovative charge-coupled device—essentially a high-tech digital camera—developed at Goddard and used on the Hubble Space Telescope contributed to the development of a non-surgical breast biopsy technique. Known as stereotactic large-core needle biopsy, the technique is a less traumatic alternative to surgical biopsy, saving patients time, pain, scarring, radiation exposure, and money.



top ten | technology spinoffs

Insulin Delivery System (1988)

When implanted in the human body, the Programmable Implantable Medication System (PIMS) delivers precise amounts of insulin over long periods of time. Originally developed at the Applied Physics Laboratory at Johns Hopkins University under sponsorship from Goddard, the technology was licensed and refined by MiniMed Technologies. It is estimated that one million insulin-dependent diabetics in the United States will benefit from implantable infusion systems.



Sports



Ingestible Thermometer Pill Aids Athletes in Beating the Heat (2006)

From the football turf to high above the Earth, heat exhaustion is a life-threatening concern. In order to monitor the body temperature of astronauts during space flight, Goddard teamed up

with Johns Hopkins University in the late 1980s to develop the Ingestible Thermal Monitoring System. Incorporating a number of space technologies, including wireless telemetry (signal transmission), micro-miniaturized circuitry, sensors, and batteries, the “thermometer pill” became commercially available in 1988. It is now widely accepted as an essential tool in detecting dangerously high body temperature during sporting events and training and could be used in military and commercial applications.

A Gold Medal Finish (2002)

At the 2002 Olympics in Salt Lake City, U.S. speed skaters won a total of 11 medals thanks in part to a “competitive edge” that resulted from the efforts of Goddard’s technology transfer program. The athletes used a new polishing tool that gave their skates nearly a 15% improvement in glide. Developed by a former Goddard optics engineer, the tool was based upon the same principles used in polishing space flight optics.



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Transportation



Intellectual Dummies (2002)

Goddard collaborated with North Carolina small business Triangle Research & Development Corp. to develop a robotic vision system to aid assembly of the International Space Station. The company went on to work with the U.S. Department of Transportation, pairing the “Smart Eyes” technology with a new crash test dummy mask. The result was a system that provides computerized evaluations of laceration injury, which has been used by automobile and component manufacturers worldwide in vehicle testing.



Enhanced Highway and Bridge Safety (2006)

Goddard worked with Turner-Fairbank Highway Research Center to help apply NASA’s award-winning signal processing technology—known as HHT for Hilbert-Huang Transform—to analyses of traffic flow data, wind and traffic interaction with bridges, and damage detection in pavement and bridges. Forming the basis of Turner-Fairbank’s Digital Highway Measurement Project, these analyses were the first steps in a

dramatic shift in the way state departments of transportation can improve the safety and performance of the nation’s highway infrastructure.

Materials

Low-Cost, High-Quality Carbon Nanotubes Enter the Marketplace (2006)

Goddard’s award-winning process for manufacturing carbon nanotubes (CNTs) has been licensed by four U.S. companies. Goddard’s process is simpler, safer, and much less expensive than other CNT manufacturing methods; therefore, its availability in the marketplace means that university and industry researchers now have access to high-quality single-walled CNTs. Potential uses for these nano-based materials are vast and include medical, construction, manufacturing, and imaging applications.

